## Code No: 861AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA I Semester Examinations, July/August - 2021 COMPUTER ORIENTED STATISTICAL METHODS
Time: 3 Hours

Max. Marks: 75

## Answer any five questions All questions carry equal marks

1.a) In a certain assembly plant, three machines, B1, B2, and B3, make $30 \%, 45 \%$, and $25 \%$, respectively, of the products. It is known from past experience that $2 \%, 3 \%$, and $2 \%$ of the products made by each machine, respectively, are defective. What is the probability that a randomly selected finished product is defective?
b) You enter a chess tournament where your probability of winning a game is 0.3 against half the players 0.4 against a quarter of the players and 0.5 against the remaining quarter of the players you play a game against a randomly chosen opponent. What is the probability of winning?
2.a) A random variable X may assume 4 values with probabilities $\frac{1+3 x}{4}, \frac{1-x}{4}, \frac{1+2 x}{4}, \frac{1-4 x}{4}$. Find the condition on x so that these values represent the probability function of X .
b) The joint probability density function of two random variables X and Y is

$$
f_{x y}(x, y)=\left\{\begin{array}{lr}
\frac{5}{16} x^{2} y & \text { for } 0<y<x<2 \\
0 & \text { other wise }
\end{array}\right.
$$

Find: i) the marginal density of $X$ and $Y$
ii) Are X and Y are independent?
[7+8]
3.a) Find the mean of the random variable whose probability density function is given by $\mathrm{f}(x)=3 / 510^{-5}(100-x) \quad 0 \leq x \leq 100$.
b) If X is the number appearing on a die when it is thrown, show that the Chebshev's theorem given $\mathrm{P}[|\mathrm{X}-\mu|>2.5]<0.47$, while the actual probability is zero. [8+7]
4.a) Show that mean $=$ variance for a Poisson distribution.
b) Probability of a success is given by 0.4 if $\mathrm{n}=8$, find the i) $\mathrm{P}(x \geq 1)$ ii) $\mathrm{P}(0<x<4)$. [7+8]
5.a) The lognormal distribution is found to be a good model for strains in structural members caused by wind loads. Let the strain be represented by $X$, with $\mathrm{m}_{X}=1$ and variance of $X$ is 0.09 . (i) Determine the probability $\mathrm{P}(X>12)$. (ii) If stress $Y$ in a structural member is related to the strain by $Y=\mathrm{a}+\mathrm{b} X$, with $\mathrm{b}>0$, determine $\mathrm{f}_{Y}(y)$ and $\mathrm{m}_{Y}$.
b) The life of a power transmission tower is exponentially distributed, with mean life 25 years. If three towers, operated independently, are being erected at the same time, what is the probability that at least 2 will still stand after 35 years?
6.a) Take 30 slips of paper and lable 5 each -4 and +4 , lable 4 from each -3 and 3, three each -2 and 2 and two each $-1,0$, and 1 . If each slip of paper has the same probability of being drawn, find the probabilities of getting $-4,-3,-2,-1,0,1,2,3,4$ and find the mean and the variance of this distribution.
b) Find the probabilities that a random variable having the standard normal distribution will take on a value i) Between 0.87 and 1.28 ii) between -0.34 and 0.62 .
7.a) A manufacturer of electric lamps is testing a new production method that will be considered acceptable if the lamps produced by this method result in a normal population with an average life of 2,400 hours and a standard deviation equal to 300 . A sample of 100 lamps produced by this method has an average life of 2,320 hours. Can the hypothesis of validity for the new manufacturing process be accepted with a risk equal to or less than $5 \%$ ?
b) Among 200 items 50 are defective and from another sample among 400 items 80 are defective. Test at 0.05 level whether there is a significant difference between the proportions.
8.a) Find the linear least square fit $y=a x+b$ for the experimental data points given by: $\{(1,2),(3,4),(2,6),(4,8),(5,12),(6,13),(7,15)\}$
b) The following regressions equations were obtained from a correction table $y=0.516 x+33.73 \quad x=0.512 y+32.52$
Find the value of i) The correlation coefficient ii) The mean $x$ 's iii) the mean of $y$ 's.
---00000---

